This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-9 (cancelled)

Claim 10 (new): In a combination differential and absolute pressure transducer for controlling an exterior door and an interior door of a load lock chamber used to facilitate transfer of parts between a room at ambient atmospheric pressure and a vacuum processing chamber maintained at a pressure less than one (1) torr by matching load lock pressure to atmospheric pressure P_A when the exterior door is to be opened and matching load lock pressure to the pressure in the vacuum processing chamber when the interior door is to be opened, wherein the combination differential and absolute pressure transducer has (i) a manifold connected in fluid flow relation to the load lock chamber so that pressure in the manifold is equal to pressure in the load lock chamber, (ii) a differential pressure sensor connected to the manifold and being configured for sensing and outputting a differential pressure signal that is indicative of pressure differential between atmospheric pressure and load lock pressure in the manifold and load lock chamber (iii) a differential pressure transducer circuit connected electrically to the differential pressure sensor and being capable of generating an exterior door control signal at a preset differential pressure value for opening or allowing opening of the exterior door, (iv) an absolute pressure sensor connected to the manifold for sensing and outputting an absolute pressure signal that is indicative of absolute pressure in the manifold and load lock chamber; and (v) an absolute pressure transducer circuit connected electrically to the absolute pressure sensor and being capable of generating an interior door control signal at a preset absolute pressure value for opening or allowing opening of the interior door, an improvement comprising:

a miniaturized combination differential and absolute pressure transducer in which the differential pressure sensor and the absolute pressure sensor are mounted and electrically connected in an integral manner to a printed circuit board that contains the differential pressure transducer circuit and the absolute pressure transducer circuit, and wherein the printed circuit board is attached to a manifold in a

manner that seals the differential pressure sensor and the absolute pressure sensor to the manifold in fluid flow communication with ducts in the manifold that are adapted to be in fluid flow communication with the load lock chamber when the manifold is connected to the load lock chamber.

Claim 11 (new): The improvement of claim 10, wherein the ducts in the manifold extend between a top surface and a bottom opening surrounded by a connector, which is configured to connect the manifold to the load lock chamber, and wherein the printed circuit board is connected with screws to the top surface of the manifold in a manner that snugs the differential pressure sensor and the absolute pressure sensor between the printed circuit board and the top surface of the manifold with the differential pressure sensor positioned in alignment with one of the ducts and the absolute pressure sensor positioned in alignment with the other one of the ducts.

Claim 12 (new): The improvement of claim 11, including an o-ring seal positioned around said one of said ducts and squeezed between the differential pressure sensor on the printed circuit board and the top surface of the manifold.

Claim 13 (new): The improvement of claim 11, including an o-ring seal positioned around said other one of said ducts and squeezed between the absolute pressure sensor on the printed circuit board and the top surface of the manifold.

Claim 14 (new): The improvement of claim 10, wherein the printed circuit board includes a bottom panel that is substantially parallel to the top surface of the manifold, and wherein the differential pressure sensor and the absolute pressure sensor are mounted on said bottom panel, electrically conductive traces in the bottom panel connect the differential pressure sensor to the differential pressure transducer circuit, electrically conductive traces in the bottom panel connect the absolute pressure sensor to the absolute pressure transducer circuit, and screws extending through the bottom panel connect the printed circuit board with the differential and absolute pressure sensors to the manifold.

Claim 15 (new): The improvement of claim 10, wherein the absolute pressure sensor is a micropirani pressure sensor comprising: a substrate with a cavity in the substrate; a dielectric film membrane extending over and covering the cavity with at least one pressure equalization hole extending through the membrane to the cavity to equalize pressures over and under the membrane; at least one electrically resistive element deposited on the membrane; and at least one additional resistive element deposited on the substrate, but not on the membrane;

said resistive elements being connected as components of a bridge circuit into the absolute pressure transducer circuit.

Claim 16 (new): The improvement of claim 15, including a dielectric film passivation layer deposited on and covering the dielectric film membrane and resistive elements.

Claim 17 (new): The improvement of claim 15:

(i) wherein heat conduction away from the resistive element that is positioned on the membrane is a function of absolute pressure and temperature of a gas adjacent the membrane, wherein such heat conduction affects resistivity of said resistive element on the membrane, and wherein such resistivity is measurable by the bridge circuit as an indication of absolute pressure of the gas adjacent the membrane, and

(ii) wherein heat conduction away from the resistive element that is positioned on the substrate is less subject to absolute pressure of the gas adjacent the membrane than said resistive element that is positioned on the membrane, but is as subject as the resistive element positioned on the substrate to temperature of the gas adjacent the membrane, and wherein such resistivity of said resistive element on the substrate functions in the bridge circuit as an offset to temperature effects of the gas on resistivity of the element on the membrane so that the bridge circuit functions to measure absolute pressure of the gas adjacent the membrane substantially independent of the temperature of said gas.

Claim 18 (new): The improvement of claim 17, including a cover, said cover having a cavity positioned over the membrane opposite the cavity in the substrate, said cover having an opening extending from outside of the cover to the cavity in the cover so that the gas is free to flow between the manifold and the cavities.

Claim 19 (new): The improvement of claim 18, wherein the cavity in the cover has a volume and the cavity in the substrate has a volume, and wherein the volume of the cavity in the cover is substantially equal to the volume of the cavity in the substrate.

Claim 20 (new): The improvement of claim 19, wherein the cavities in the substrate and cover are small enough such that distances from the membrane across the cavities to the substrate and cover, respectively, are less than thermal boundary layers that form around the filaments in order to minimize effects of environment temperature changes on absolute pressure sensor output.

Claim 21 (new): The improvement of claim 20, wherein such distances from the membrane across the cavities to the substrate and cover, respectively, are not more than ten times the mean free path of gas molecules in the cavities.

Claim 22 (new): The improvement of claim 21, wherein such distances from the membrane across the cavities to the substrate and cover, respectively, are about 20 μm.

Claim 23 (new): The improvement of claim 22, wherein sensitivity of the absolute pressure sensor without undesirable flat zones spans a range 10^{-5} to 1,000 torr.

Claim 24 (new): The improvement of claim 23, including an auxiliary amplifier in the absolute pressure transducer circuit for additional sensitivity and measurability at pressures below 10^{-4} torr.

Claim 25 (new): The improvement of claim 10, wherein the differential pressure sensor includes a piezo differential pressure sensor and is mounted by a potting material in a housing in a manner that divides the housing so that a top surface of the piezo differential pressure sensor is exposed only to ambient atmospheric pressure P_A and a bottom surface of

the piezo differential pressure sensor is exposed only to load lock pressure P_L with the housing attached to the printed circuit board and the printed circuit board attached to the manifold.

Claim 26 (new): A miniaturized combination differential and absolute pressure transducer for producing control signals based on pressure in a chamber, comprising:

a printed circuit board comprising a differential pressure transducer circuit and an absolute pressure transducer circuit, including a differential pressure sensor connected to the printed circuit board mechanically and electrically as an integral component of the differential pressure transducer circuit, an absolute pressure sensor connected to the printed circuit board mechanically and electrically as an integral component of the absolute pressure transducer circuit; and an electrical connector connected to the printed circuit board mechanically and electrically as an integral component for output of the control signals from the differential pressure transducer circuit and from the absolute pressure circuit; and

a manifold with a connector fitting adapted for connection of the manifold to the chamber and with ducts extending between the connector fitting and a surface, wherein said printed circuit board is mounted on said manifold with the differential pressure sensor and the absolute pressure sensor sealed against said surface around respective ones of said ducts such that said differential pressure sensor and said absolute pressure sensor are exposed to the pressure in the chamber via said ducts upon connection of the manifold to the chamber.

Claim 27 (new): A combination differential and absolute pressure transducer for producing load lock control signals based on pressure in a load lock chamber, comprising:

a micropirani absolute pressure sensor, which includes: (i) a substrate with a first cavity extending into its midsection and positioned in fluid flow communication with the load lock chamber such that gas pressure in the first cavity is the same as gas pressure in the load lock chamber; (ii) a cover with a second cavity extending into its midsection, said cover being positioned on the substrate with said second cavity

juxtaposed to said first cavity and in fluid flow communication with the load lock chamber so that gas pressure in the second cavity is also the same as the gas pressure in the load lock chamber; (iii) a membrane extending between the first cavity and the second cavity; (iv) a first resistive element positioned in the membrane, said resistive element having a resistivity that changes as a function of temperature; and a second resistive element positioned on the substrate;

a differential pressure sensor, which includes: (i) A substrate supporting a resiliently flexible membrane, said substrate being mounted and sealed in such a manner that one side of the membrane is exposed to ambient atmospheric pressure and the opposite side is exposed to a cavity that is in fluid flow communication with the load lock chamber such that gas pressure in said cavity on said opposite side of the membrane is the same as the gas pressure in the load lock chamber; and (ii) a third resistive element that changes resistivity as a function of flexture positioned on the membrane; and

a load lock control circuit comprising: (i) an absolute pressure transducer circuit including micropirani sensor bridge circuit in which the first and second resistive elements are connected as separate branches, a first bridge voltage controller for maintaining balance in the micropirani sensor bridge circuit, a first voltage monitor for measuring voltages needed to keep the micropirani sensor bridge circuit in balance as an indication of absolute pressure in the load lock chamber, and a first relay control circuit set to activate a first relay switch to produce a first control signal when the pressure of gas in the load lock chamber is pumped down to an absolute pressure set point; and (ii) a differential pressure transducer circuit including a differential pressure sensor bridge circuit in which said third resistive element is connected as a branch, a second bridge voltage controller for maintaining balance in the differential pressure sensor bridge circuit, a second voltage monitor for measuring voltages needed to keep the differential pressure sensor bridge circuit in balance as an indication of differential pressure between ambient atmospheric pressure and the gas pressure in the load lock chamber, and a second relay control circuit set to actuate a

second relay switch to produce a second control signal when the differential pressure reaches a differential pressure set point.

Claim 28 (new): The combination differential and absolute pressure transducer of claim 27, wherein the first cavity and the second cavity in the micropirani absolute pressure sensor are each smaller than a thermal boundary layer that forms adjacent the resistive elements.

Claim 29 (new): The combination differential and absolute pressure transducer of claim 28, wherein the first cavity and the second cavity are each about 20 μm deep.